

Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (currently amended): A continuous method for producing at least one polyol from lactose comprising:

(a) catalytically hydrolyzing lactose to produce a hydrolyzate that includes at least one monosaccharide;

(b) subsequently hydrogenating the hydrolyzate to produce an alditol-containing intermediate composition; and

(c) hydrogenolyzing the alditol-containing intermediate composition to produce at least one polyol,

wherein steps (b) and (c) are performed in the presence of a catalyst having a support selected from titania in the rutile form, zirconia in the monoclinic form, high-surface area granulated carbon or boehmite.

Claim 2 (currently amended): A method according to claim 1 wherein step (a) comprises hydrolyzing lactose to convert about 90 ~~at~~ to about 100 weight % of the lactose into monosaccharide.

Claim 3 (original): A method according to claim 1 wherein step (a) is completed prior to initiation of step (b).

Claim 4 (original): A method according to claim 1 wherein step (c) is performed in the presence of a catalyst comprising a plurality of porous particles on which are deposited (i) a nickel metal or reduced nickel as a dispersed phase and (ii) an additional metal as an additional dispersed phase.

Claim 5 (original): A method according to claim 1 wherein the polyol comprises ethylene glycol, propylene glycol or glycerol.

Claim 6 (original): A method according to claim 1 wherein the hydrolyzate comprises a mixture of glucose and galactose.

Claim 7 (original): A method according to claim 1 wherein the alditol-containing intermediate composition comprises a mixture of sorbitol and dulcitol.

Claim 8 (original): A method according to claim 1 further comprising providing the lactose in an aqueous composition that includes at least about 15 dry solids weight percent lactose based on the total weight of the aqueous composition.

Claim 9 (original): A method according to claim 1 wherein step (c) further comprises adding a base to the alditol-containing intermediate composition.

Claim 10 (canceled).

Claim 11 (original): A method according to claim 1 wherein steps (a), (b) and (c) are performed in an aqueous medium.

Claim 12 (original): A method for producing at least one polyol from lactose comprising:

(a) hydrolyzing lactose to produce a hydrolyzate that includes at least one monosaccharide;

(b) catalytically hydrogenating the hydrolyzate to produce an alditol-containing intermediate composition, wherein the hydrogenation catalyst comprises ruthenium disposed on a titania support; and

(c) hydrogenolyzing the alditol-containing intermediate composition to produce at least one polyol.

Claim 13 (original): A method according to claim 12 wherein the polyol comprises ethylene glycol, propylene glycol or glycerol.

Claim 14 (original): A method according to claim 12 wherein the hydrolyzate comprises a mixture of glucose and galactose.

Claim 15 (original): A method according to claim 12 wherein the alditol-containing intermediate composition comprises a mixture of sorbitol and dulcitol.

Claim 16 (original): A method according to claim 12 further comprising providing the lactose in an aqueous composition that includes at least about 15 dry solids weight percent lactose based on the total weight of the aqueous composition.

Claim 17 (original): A method according to claim 12 wherein the hydrogenation catalyst comprises ruthenium disposed on a rutile support.

Claim 18 (original): A method according to claim 12 wherein step (c) is performed in the presence of a catalyst comprising a plurality of porous particles on which are deposited (i) a nickel metal or reduced nickel as a dispersed phase and (ii) an additional metal as an additional dispersed phase.

Claims 19-26 (canceled).

Claim 27 (original): A method for producing at least one lower carbon polyhydric alcohol from lactose comprising:

(a) catalytically hydrolyzing lactose to produce a hydrolyzate that includes at least one monosaccharide, wherein the hydrolysis catalyst comprises a solid acid or an enzyme;

(b) subsequently catalytically hydrogenating the hydrolyzate to produce an alditol-containing intermediate composition, wherein the hydrogenation catalyst comprises ruthenium disposed on a titania support; and

(c) hydrogenolyzing the alditol-containing intermediate composition to produce at least one lower carbon polyhydric alcohol.

Claim 28 (original): A method according to claim 27 wherein the hydrolyzate comprises a mixture of glucose and galactose.

Claim 29 (original): A method according to claim 27 wherein the alditol-containing intermediate composition comprises a mixture of sorbitol and dulcitol.

Claim 30 (original): A method according to claim 27 further comprising providing the lactose in an aqueous composition that includes at least about 15 dry solids weight percent lactose based on the total weight of the aqueous composition.

Claim 31 (original): A method according to claim 27 wherein steps (a), (b) and (c) are performed in an aqueous medium.

Claims 32-38 (canceled).

Claim 39 (currently amended): A method for producing at least one polyol from lactose comprising:

(a) heating lactose in the presence of water and an enzyme to produce a first intermediate;

(b) subsequently heating the first intermediate in the presence of hydrogen and a catalyst to produce a second intermediate; and

(c) heating the second intermediate in the presence of hydrogen, a catalyst, and a base to produce at least one polyol,

wherein the catalyst in step (b) comprises ruthenium disposed on a titania support.

Claim 40 (previously presented): A method according to claim 39 wherein the enzyme in step (a) comprises immobilized β -galactosidase.

Claim 41 (original): A method according to claim 39 wherein step (a) is performed in an aqueous medium with a pH of about 3 to about 7.

Claim 42 (original): A method according to claim 39 wherein step (b) comprises heating the first intermediate at a temperature of about 80 to about 180 °C.

Claim 43 (canceled).

Claim 44 (original): A method according to claim 39 wherein step (c) comprises heating the second intermediate at a temperature of about 150 to about 300 °C.

Claim 45 (original): A method according to claim 44 wherein the catalyst in step (c) comprises a plurality of porous particles on which are deposited (i) a nickel metal or reduced nickel as a dispersed phase and (ii) an additional metal as an additional dispersed phase.

Claim 46 (currently amended): A method according to claim ~~19~~ 27, wherein the enzyme comprises an immobilized enzyme.

Claim 47 (previously presented): A method according to claim 39, wherein the enzyme comprises an immobilized enzyme.

Claim 48 (new): A method according to claim 27 wherein the solid acid catalyst is selected from an ion exchange resin and a perfluorinated polymeric resin.

Claim 49 (new): A method according to claim 27 wherein the enzyme comprises immobilized β -galactosidase.

Claim 50 (new): A method according to claim 27 wherein step (a) does not include adding a liquid acid.

Claim 51 (new): A method according to claim 12 wherein step (c) further comprises adding a base to the alditol-containing intermediate composition.

Claim 52 (new): A method according to claim 27 wherein step (c) further comprises adding a base to the alditol-containing intermediate composition.